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Attention!
Product discontinuation due to EC RoHS directive
More info: www.addi-data.com

CE

Technical description

ADDICOM PA 7400

Communication adapter

4th edition 07/1999

Guarantee and responsibility

Basically are effective our "general terms of delivery and payment". The manager receives them at the latest with the invoice. Claims for guarantee and responsibility in case of injuries and material damages are excluded, if they are due to one or some of the following causes:

- if the board has not been used for the intended purpose
- improper installation, operation and maintenance of the board
- if the board has been operated with defective safety devices or with not appropriate or non-functioning safety equipment
- nonobservance of the instructions concerning: transport, storage, inserting the board, use, limit values, maintenance, device drivers
- altering the board at the user's own initiative
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- not checking properly the parts which are subject to wear
- disasters caused by the intrusion of foreign bodies and by influence beyond the user's control.

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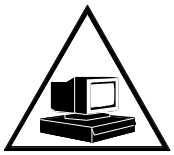
The original version of this manual is in German. You can obtain it on request.

WARNING

In case of wrong use and if the board is not used for the purpose it is intended for:

people may be injured



the board, PC and peripheral may be destroyed

the environment may be polluted

★★★ Protect yourself, the others and the environment★★★

· **Do read the safety leaflet!**
If this leaflet is not with the manual, please contact us and ask for it.

· **Observe the instructions of the manual!**
Make sure that you do not forget or skip any step. We are not liable for damages resulting from a wrong use of the board.

· **Symbols used**

WARNING!
It designates a possibly dangerous situation.
If the instructions are ignored **the board, PC and/or peripheral may be damaged**.

IMPORTANT!
designates hints and other useful information.

· **Any question?**
Our technical support is at your disposal

CE

Declaration of Conformity

This declaration is valid for the following product:

ADDICOM PA 7400
Communication adapter

It is made by

ADDI-DATA GmbH
Meß- und Steuerungstechnik
Dieselstraße 3
D-77833 Ottersweier

in sole responsibility and is valid on the understanding that the product is competently installed, used and maintained, according to the respective security regulations as well as to the manufacturer's instructions regarding its intended use.

This declaration states that the product complies with following EC Directives:

- **EWGRL 336/89 of 3.05.1989**
- **EWGRL 31/92 of 28.04.1992**
- **EWGRL 68/93 of 22.07.1993**

This declaration is valid for all units manufactured according to the manufacturing references listed in the form TD7400.020.

Following norms have been applied to test the product regarding electromagnetic compatibility:

- **EN55011/03.91**
- **EN55022/08.94**
- **EN50082-2/03.95**

We point out that

- the conformity and herewith the permission of use expire if the user alters the product without consulting with the manufacturer.
- non-skilled users are to have the operational area of the product and the requirements resulting from it checked prior to putting into operation.
- by using this product in appliances coming under the EC EMC Directive, the user is to make sure they are conform to its regulations prior to putting into operation.
- by using this product in machines / installations coming under the EU Machine Directive, the user is to make sure they are conform to its regulations prior to putting into operation.

A copy of the EMC tests is at your disposal on request.

15th October 1995 Legally valid signature of the manufacturer

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1 INTENDED PURPOSE OF THE BOARD

The board **PA 7400** provides the personal computer (PC) with a 2-port asynchronous serial interface for the communication with external devices and a 1-port parallel interface for the connection of printers.

The board is to be used in a free PC ISA slot. The PC is to comply with the EU directive 89/336/EWG and the specifications for EMC protection.

Products complying with these specifications bear the CE mark.

Serial data is exchanged with external communication devices through the 9-pin SUB-D male connector of the board **PA 7400** in the chosen transmission mode (RS422, RS485 or 20 mA current loop).

Serial data is also exchanged with external devices through the 25-pin SUB-D male connector of the board **PA 7400** in the chosen transmission mode RS232, RS422, RS485 or 20 mA current loop.

The 26-pin male connector can be connected to ribbon cable which enables the connection of the board **PA 7400** with the external shielded connection cable. The ribbon cable is mounted on a bracket so that the external cable can be screwed to the PC housing.

The connection with the external cables is to comply with the specifications:
- metallized plastic hoods
- shielded cable
- cable shield folded back and firmly screwed to the connector housing.

The use of the board according to its intended purpose includes observing all advises given in this manual and in the safety leaflet. Uses beyond these specifications are not allowed. The manufacturer is not liable for any damages which would result from the non-observance of this clause.

Table 1-1: Operating mode according to type of communication

Communication	Operating modes	Optical isolation
Serial over port 1	RS 232 RS 422 RS 485 20mA current loop	no yes yes yes
Serial over port 2	RS 422 RS 485 20mA current loop	yes yes yes
parallel		no

1.1 Limits of use

The use of the board in a PC could change the PC features regarding noise emission and immunity. Increased noise emission or decreased noise immunity could result in the system not being conform anymore.

Check the shielding capacity of the PC housing and cable prior to putting the device into operation.

Connection to the peripheral
with a shielded cable, twisted in pairs.
Connect the peripheral cable so that the differential lines described in the connector pin assignment with "+" and "-" are twisted in pairs.

Operating mode RS232: the signal lines are to be twisted in pairs with GND.

The housing of the peripheral connector
- is to be firmly screwed together with the shield of the cable
- is to assure a low-resistance connection (< 100 mΩ) between the shield and the housing of the PC.

The shield of the cable is to be earthed on both sides.

Make sure that the board remains in the protective blister pack **until it is used**.

Do not remove or alter the identification numbers of the board.
If you do, the guarantee expires.

2 USER

2.1 Qualification

Only persons trained in electronics are entitled to perform the following tasks:

- installation,
- putting into operation,
- use,
- maintenance.

2.2 Personal protection

Consider the country-specific regulations about

- the prevention of accidents
- electrical and mechanical installations
- radio interference suppression.

3 HANDLING THE BOARD

Fig. 3-1: Wrong handling

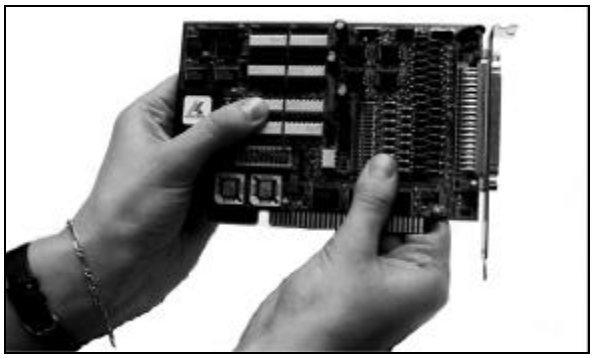
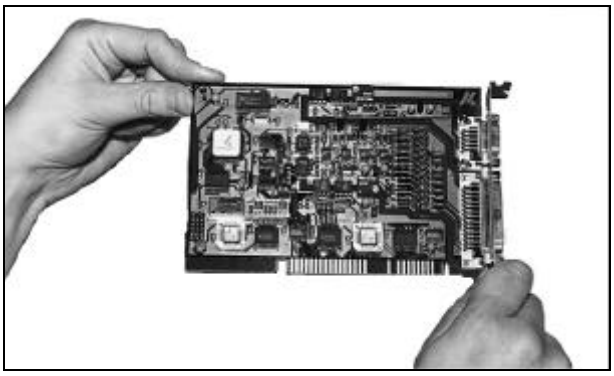


Fig. 3-2: Correct handling



4 TECHNICAL DATA

4.1 Electromagnetic compatibility

The board has been subjected to EMC tests in an accredited laboratory in accordance with the norms EN50082-2, EN55011, EN55022.
The board complies with the limit values set by the norm EN50082-2 as follows:

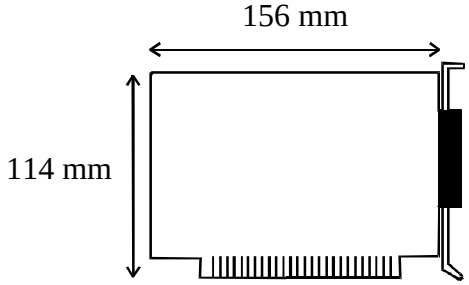
	True value	Set value
ESD	4 kV	4 kV
Fields	10 V/m	10 V/m
Burst	4 kV	2 kV
Conducted radio interferences	10 V	10 V

WARNING!
The EMC tests have been carried out in a specific appliance configuration. We guarantee these limit values **only** in this configuration

Consider the following aspects:
- your test program must be able to detect operation errors.
- **your system must be set up so** that you can find out what caused errors.

4.2 Physical set-up of the board

The board is assembled on a 4- layer printed circuit card.



Installation in:	AT slot
Connectors:	Serial port 1: 25-pin SUB-D male connector Serial port 2: 9-pin SUB-D male connector Parallel port 1: 26-pin male connector

4.3 Options

Option 2U 2 x UART with 16-byte FIFO memory

Option 2S Addressing through DIP switches

4.4 Versions

The board **PA 7400** is available in 3 versions:

PA 7400 VRC: 2-port serial interface with
1 x RS232 without optical isolation
2 x RS422, RS485, 20 mA Current Loop with optical isolation
1 parallel interface

PA 7400 VR 2-port serial interface with
1 x RS232 without optical isolation
2 x RS422, RS485 with optical isolation
1 parallel interface

PA 7400 VC 2-port serial interface with
1 x RS232 without optical isolation
2 x 20 mA Current Loop with optical isolation
1 parallel interface

4.5 Limit values

Operating temperature: ..... 0 to 60°C
Storage temperature: ..... -25 to 70°C
Relative humidity: ..... 30% to 95% non condensing

Minimum PC requirements:
- operating system: .....MS DOS 3.3,
Windows 3.1 and >

Energy requirements:
- operating voltage of the PC: ..... 5V ± 5%
- current consumption in mA (without load): ...typ. See table ± 5%

	PA7400
+ 5 V from PC	200 mA
+ 12 V from PC	45 mA

Serial ports:

Modes:

Serial port 1:	RS232, RS422, RS485 or 20 mA current loop (active, passive)
Serial port 2:	RS422, RS485 or 20 mA current loop (active, passive)
Addressing:	COM1, COM2, COM3, COM4 selectable per jumper or with each address through DIP switches
Memory:	UART with 16-byte FIFO buffer
Protocol:	5-, 6-, 7- or 8-bit character
Parity:	Even, odd, none, mark and space 1, 1 ½ or 2 stop bits

Transfer rates:

• RS 232:	max. 19200 Baud (only serial port 1)
• RS 422/RS 485:	max. 112000 Baud
• 20 mA current loop:	max 19200 Baud

Load resistance :

20mA current loop:	≤ 300 ohm

Overvoltage protection:

• RS 422/RS 485:	Breakdown voltage = ± 6.5 V VCL[1)] = ± 11.3 V; at Ipp[2)] = 35.4 A in 1 ms test Ppp[3)] = SURGE 300 W / 1 ms All lines are protected against short-circuit through PTC resistors.
• 20mA current loop:	Breakdown voltage = ± 26 V VCL = ± 41.5 V; at Ipp = 9.6 A in the 1 ms test Ppp = SURGE 400 W/1 ms
Insulation voltage:	1K VAC (RS 422/RS 485 and 20 mA current loop)

1 Clamping voltage
2 Surge non repetitive reverse current
3 Peak Pulse Power

Parallel port

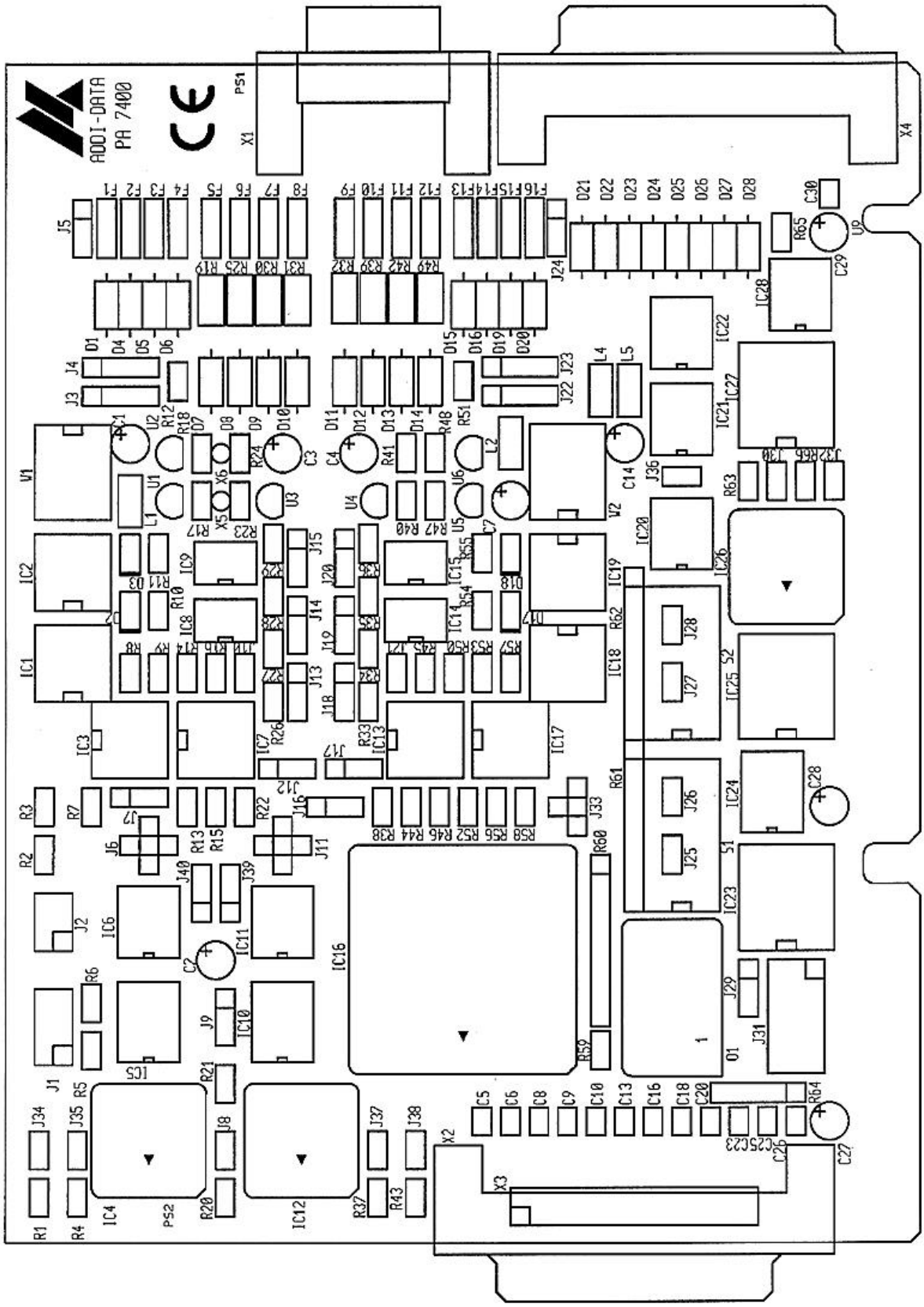
Compatibility: ..... TTL- compatible
Input at logic "0": ..... max 0.8 V
Input at logic "1": ..... min 2.2 V
Output at logic "0": ..... max 0.4 V / 6 mA
Output at logic "1": ..... min 2.4 V / 6 mA
Addressing: LPT1-3
Interrupt lines: IRQ5, IRQ7

Safety:
Optical isolation: ..... 1000 V
Overvoltage protection: ..... through transil diodes
Voltage reversal protection: ..... through transil diodes
Protection against short-circuit: ..... for RS422/RS485 through PTC

5 SETTINGS

5.1 Component scheme

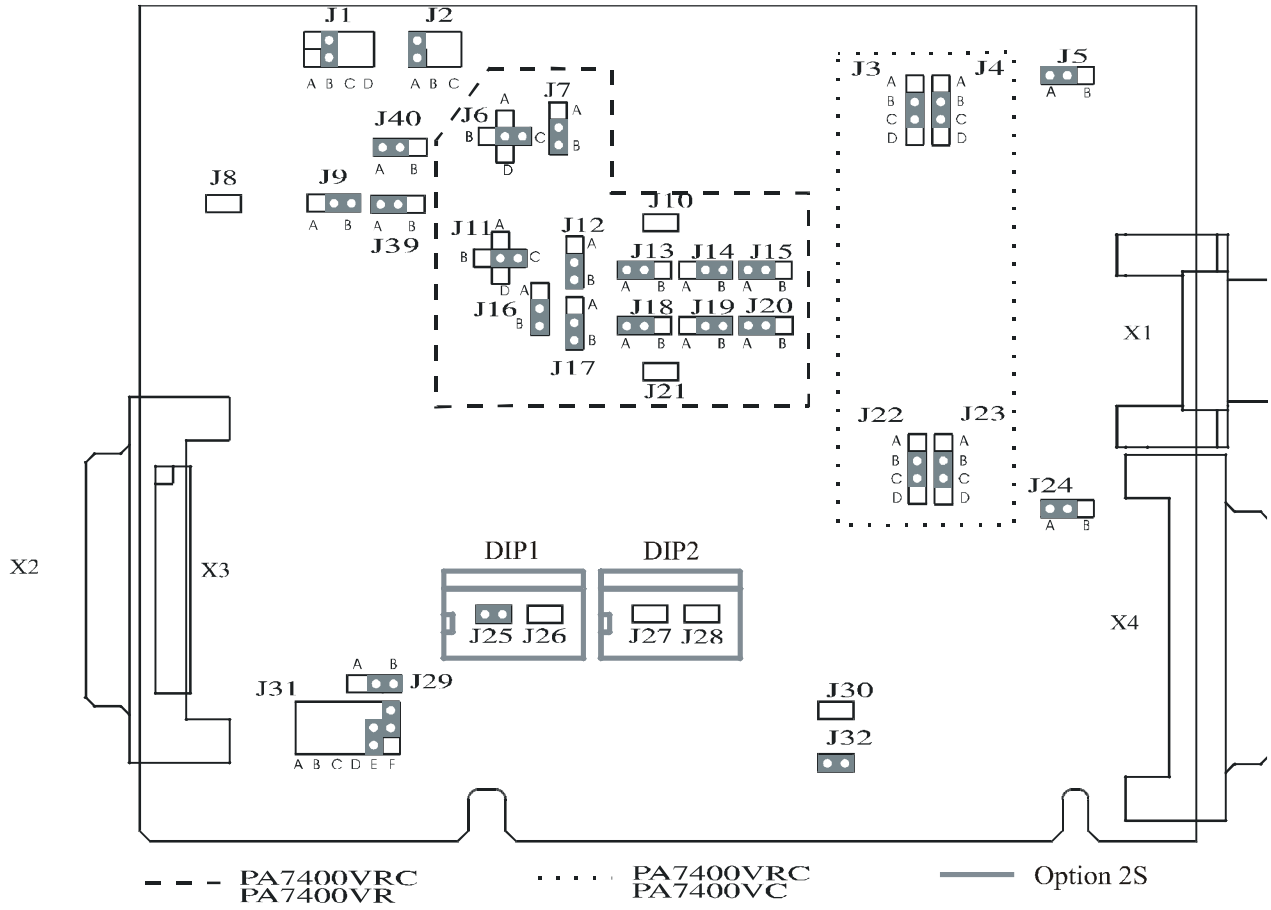
Fig. 5-1: Component scheme of the PA 7400



5.2 Jumper settings

5.2.1 Jumper location and settings at delivery

Fig. 5-2: Jumper location and settings at delivery



5.2.2 Jumper settings and functions

IMPORTANT!
The instructions about addresses, bits, jumpers and pins refer to serial port 1 and 2. The instructions for serial port 2 are in brackets (...).

e.g.	Base-S1(2) +6(7)	Jumper J11(6)
Port	1 2 1 2	1 2

WARNING!
Do not operate the board simultaneously in several modes.
Otherwise you may destroy the board, PC and/or the peripheral.

Make sure to set only the jumpers required for the respective functions.

Base address for the serial ports 1 and 2

You can also set the base address through the block of DIP switches.
See chapter 5.3: Base address

Table 5-1: Setting the base address for the serial port 1

Description	Address	Corresponding interrupt line	Jumper settings	Settings at delivery
COM1	3F8H	IRQ4 (XT)	J27 J28	✓
COM2	2F8H	IRQ3 (XT)	J27 J28	-
COM3	3E8H	IRQ10 (AT)	J27 J28	-
COM4	2E8H	IRQ11 (AT)	J27 J28	-

Table 5-2: Setting the base address for the serial port 2

Description	Address	Corresponding interrupt line	Jumper settings	Settings at delivery
COM1	3F8H	IRQ4 (XT)	J25 J26	-
COM2	2F8H	IRQ3 (XT)	J25 J26	✓
COM3	3E8H	IRQ10 (AT)	J25 J26	-
COM4	2E8H	IRQ11 (AT)	J25 J26	-

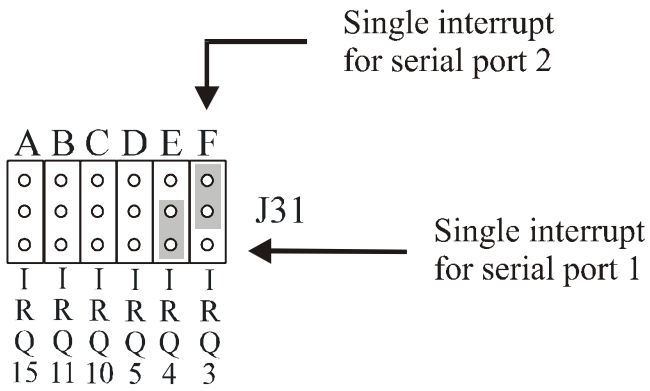
Base address for the parallel port

Table 5-3: Setting the base address for the parallel port

Description	Address	Jumper settings	Settings at delivery
Without LPT	-	J30 J32	-
LPT1	0378H	J30 J32	✓
LPT2	0278H	J30 J32	-
LPT3	03BCH	J30 J32	-

Interrupt lines - Single interrupt

Fig. 5-3: selection of the interrupt lines through jumper J31



Jumper 8 is not set.

Table 5-4: Setting the interrupt lines for the parallel port

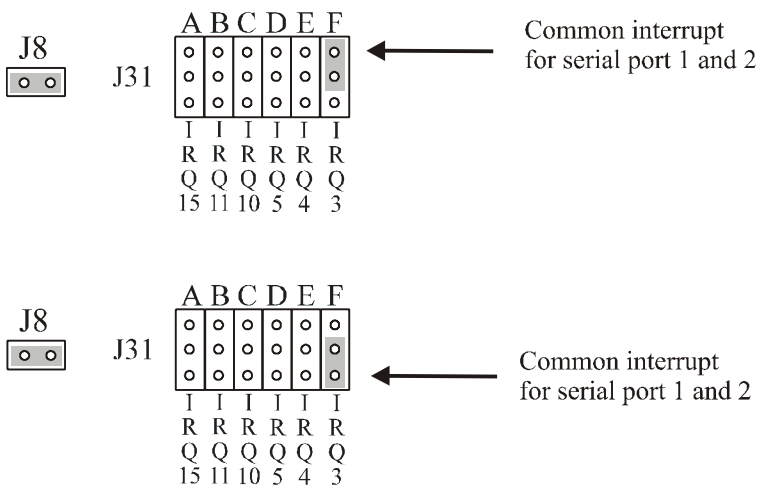
Description	Jumper settings	Settings at delivery
IRQ 7	J29 A B	✓
IRQ5	J29 A B	-
No IRQ	J29 A B	-

Interrupt lines - Common interrupt

You can save interrupt lines in your system by operating both serial ports through a common interrupt.

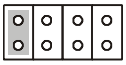
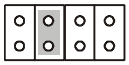
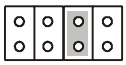
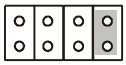
Jumper J31: You can set the jumper for common interrupt as you wish, either up or down.

Fig. 5-4: Common interrupt: Example with IRQ3



Receiving data

Table 5-5: Receiving data: jumper J1 and J2

Mode	Jumper settings	Description	Delivery
RS232	J1  A B C D	Serial port 1	-
RS422/RS485	J1  A B C D J2  A B C	J1: Serial port 1 J2: Serial port 2	✓
20 mA Current Loop	J1  A B C D J2  A B C	Preparation for receiving data: Current does not flow in rest state J1: Serial port 1 J2: Serial port 2	-
20 mA Current Loop	J1  A B C D J2  A B C	Preparation for receiving data: Current flows in rest state J1: Serial port 1 J2: Serial port 2	-

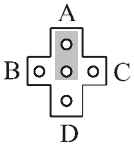
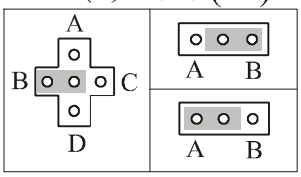
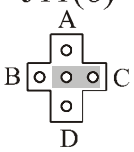
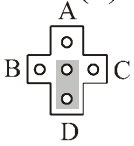
Transmitting data

Table 5-6: 20 mA Current Loop - Transmitting data

Mode	Jumper settings	Description	Delivery
20 mA Current Loop	J17(12) A  B	Current does not flow in rest state	-
	J17(12) A  B	Current flows in rest state	✓ PA 7400VC PA 7400VRC

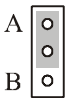
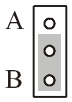
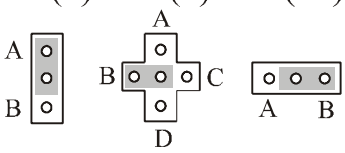
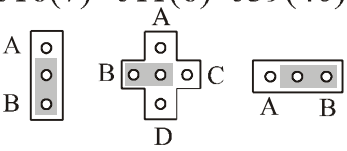
Controlling the transmitter

Table 5-7: Transmission control: J21(10) and J39(40)

Mode	Jumper settings	Description	Delivery
RS422	J21(10) 	Transmission is permanently enabled	✓
	J21(10) 	Transmitter can be controlled by bit DTRA(B)	-
RS485	J11(6) 	Control with bit RTSA(B). Bit D1 of the Modem Control Register A(B) J39(40): No function **RTSA(B)** = 0 Transmitter disabled (Reset value) **RTSA(B)** = 1 Transmitter enabled The bit **RTSA(B)** simultaneously controls the hardware pin RTSA(B) of the DUART.	-
	J11(6) J39(40) 	Automatic control - RS485 transmitter disabled - transmitter is disabled after the transmission of a mark or a group of marks	-
	J11(6) 	Control with bit DTRA(B). Bit D0 of the Modem Control Register A(B) J39(40): No function **DTRA(B)** = 0 Transmitter disabled (Reset value) **DTRA(B)** = 1 Transmitter enabled The bit **DTRA(B)** simultaneously controls the hardware pin DTRA(B) of the DUART.	✓
	J11(6) 	Control with bit DATA-DIR-1(2) Bit D0(2) of address Base-S1 +7 J39(40): No function **DATA-DIR-1(2)** = 0 Transmitter disabled (Reset value) **DATA-DIR-1(2)** = 1 Transmitter enabled The bit **DATA-DIR-1(2)** can be read on the address **Base-S1 +7.**	-

Controlling the receiver

Table 5-8: Reception control: Jumper J16(7)

Mode	Jumper settings	Description	Delivery
RS485	J16(7) 	Control with bits RTSA(B), DTRA(B) or DATA-DIR-1(2) See settings of J16(7): Fig. 8-9: Enabling the receiver	-
	J16(7) 	Control with bit RD-EN-1(2) Bit D1(3) of **Address** Base-S1 +7	✓
RS422	J16(7) J11(6) J39(40) 	Receiver is permanently enabled. **IMPORTANT:** RS485 [J11(6), J39(40)] must be disabled!	-
	J16(7) J11(6) J39(40) 	Control with bits RD-EN-1(2) on address BASE-S1+7 **IMPORTANT:** RS485 [J11(6), J39(40)] must be disabled!	-

Open-circuit potential

Table 5-9: Open-circuit potential - Jumper J19(14) and J20(15)

Mode	Jumper settings	Description	Delivery
RS422/RS485	J19(14) J20(15) 	The receiving lines RxA+(RxB+) and RxA-(RxB-) are connected in RS422/RS485 at an open-circuit potential through 1 kΩ resistors.	✓
	J19(14) J20(15) 	Inverted open-circuit potential of the receiving lines RxA+(RxB+) and RxA-(RxB-).	-

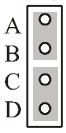
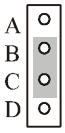
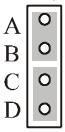
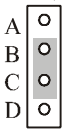
Terminator

Table 5-10: Terminator - Jumper J8(13)

Mode	Jumper settings	Description	Delivery
RS422/RS485	J18(13) 	120 Ω terminator	✓
	J18(13) 	100 Ω terminator	-

Setting the current source for 20 mA Current Loop

Table 5-11: Current source - Jumper J22(3) and J23(4)

Current source	Jumper settings	Description	Delivery
Transmitted current source	J22(3) 	Active transmission The board supplies the transmission loop with current	-
	J22(3) 	Passive transmission The peripheral supplies the transmission loop with current	✓
Receiving current source	J23(4) 	Active reception The board supplies the reception loop with current	-
	J23(4) 	Passive reception The peripheral supplies the reception loop with current	✓

Reference point of the protection circuitry

Table 5-12: Protection circuitry - J24 and J5

Port	Settings	Description	Delivery
Serial port 1	J24 	Derivation of interference potential through secondary ground GNDA of the DC/DC converter	✓
	J24 	Derivation of interference potential through Pin 1 of the 25-pin. SUB-D male connector	-
Serial port 2	J5 	Derivation of interference potential through secondary ground GNDB of the DC/DC converter	✓
	J5 	Derivation of interference potential through board bracket	-

Derivation of interference potential

Table 5-13: Derivation of interference potential - J9

Mode	Settings	Delivery
Output port	J9 	✓
Reading the external data	J9 	

5.3 Base address

WARNING!
If the base address set is wrong, the board and/or the PC may be destroyed.

Before installing the board
Check, that
- the base address is free
- the address range required by the board is not already used by the PC or by boards already installed in the PC.

Possible settings of the base address (see also "Jumper settings")

• COM1-COM4	serial port 1 serial port 2
• COM1-COM4 or any other address	serial ports 1 and 2 (option 2S).
• LPT1-LPT3	

IMPORTANT!
Find out which serial and parallel ports are already used by your PC.

• **Load** the DEBUG program.

Are recognised: COM1, COM2, LPT1, LPT2 for DOS 3.3 and
COM1-COM4, LPT1-LPT2 for >DOS 4.0

Enter	On the screen	Meaning
	C:>	
debug <return>	-	
d40:0 <return>	F8 03 F8 02 00 00 00 00 -78 03	'address 03F8 = COM1 ´address 02F8 = COM2 ´address 0378 = LPT1
q <return>		

COM1 = 03F8, COM2 = 02F8, LPT1=0378 are used in this example by the PC.

You can set the base address of the serial ports through the block DIP switches (Option 2S). In this case the jumpers J28, J27 and J26, J25 are not to be set for the serial ports 1 and 2.

Address ranges
• **Make sure** that the address ranges of the serial ports do not overlap.

Decoding of the base addresses
The base addresses of serial ports 1 and 2 are decoded each in steps 8 bytes.

See the tables 5-14 and 5-15: Decoding examples for the serial ports

Table 5-14: Setting the base address for the serial port 1 (DIP2- 0390H)

	MSB															LSB
Decoded address bus	A15	A14	A13	A12	A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1	A0
Selected Base address Hex	0				3				9				0			
Selected Base address binary	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0
DIP-switches S2 Logic "0"= ON Logic "1" = OFF	*	*	*	*	*	s8 ON	s7 OFF	s6 OFF	s5 OFF	s4 ON	s3 ON	s2 OFF	s1 ON	X	X	X

X: Decoded address range of the board
* :Permanetly decoded at logic "0"

Fig. 5-5: Block of DIP switches DIP2

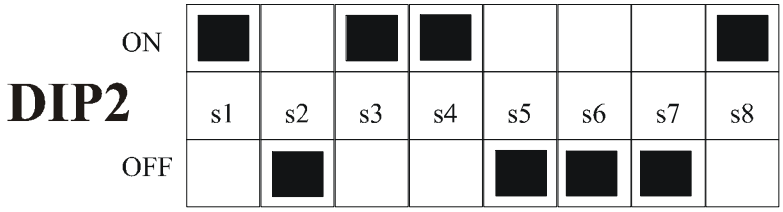
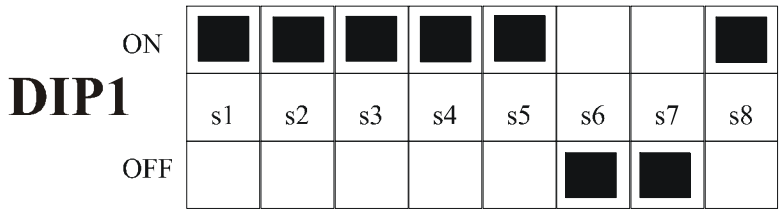


Table 5-15: Setting the base address for the serial port 2 (DIP1- 0300H)

	MSB															LSB
Decoded address bus	A15	A14	A13	A12	A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1	A0
Selected Base address Hex	0				3				0				0			
Selected Base address binary	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
DIP-switches S1 Logic "0"= ON Logic "1" = OFF	*	*	*	*	*	s8 ON	s7 OFF	s6 OFF	s5 ON	s4 ON	s3 ON	s2 ON	s1 ON	X	X	X

X: Decoded address range of the board
* :Permanetly decoded at logic "0"

Fig. 5-6: Block of DIP switches DIP1



6 INSTALLATION

IMPORTANT!
If you want to install simultaneously **several** ADDI-DATA boards, consider the following procedure.

- **Install and configure** the boards one after the other.
  You will thus avoid configuration errors.

1. Switch off the PC
2. Install the **first** board
3. Start the PC
4. Install the software (once is enough)
5. Configure the board

6. Switch off the PC
7. Install the **second** board
8. Start the PC
9. Configure the board

etc

You will find additional information to these different steps in the sections 6.1 to 6.5.

IMPORTANT!
You have installed already **one or more** ADDI-DATA boards in your computer, and you wish to install **an additional** board?

Proceed as if you wished to install one single board.

6.1 Inserting the board

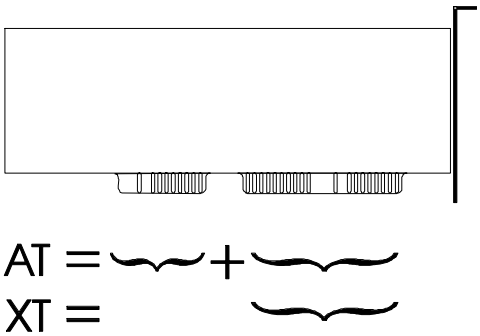
IMPORTANT!
Do observe the *safety instructions*.

6.1.1 Opening the PC

- Switch off your PC and all the units connected to the PC.
- Pull the PC mains plug from the socket.
- Open your PC as described in the manual of the PC manufacturer.

6.1.2 Selecting a free slot

Fig. 6-1: Types of slots



See in the PC manual which types of slots are free.

1. Decide
in which type of slot to insert the board.

2. Remove the back cover of the selected slot
according to the instructions of the PC manufacturer.
Keep the back cover. You will need it if you remove the board.

3. Discharge yourself from electrostatic charges

4. Take the board out of its protective blister pack

Fig. 6-2: Opening the protective blister pack

6.1.3 Plugging the board into the slot

· **Discharge yourself from electrostatic charges**
· Insert the board **vertically into the chosen slot.**

Fig. 6-3: Inserting the board

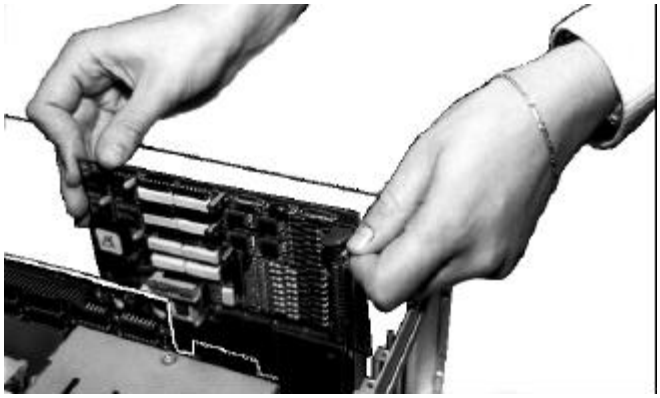
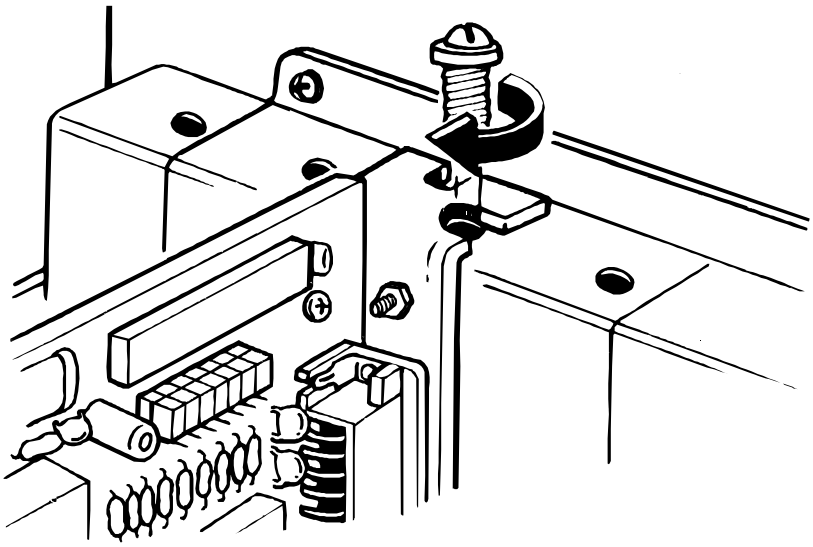


Fig. 6-4: Securing the board at the back cover



· **Tighten all the loosen screws.**

6.1.4 Closing the PC

• **Close** your PC as described in the manual of the PC manufacturer.

6.2 Installing the software

The CD contains:
- ADDIREG for Windows NT 4.0 and Windows 95,
- Standard software for the ADDI-DATA boards:
  - 16-bit for MS-DOS and Windows 3.11
  - 32-bit for Windows NT/95.

6.2.1 Software installation under MS-DOS and Windows 3.11

- Copy the contents of PA7400\16bit on a diskette.
  If several diskettes are to be used, the directory content is stored in several sub-directories (Disk1, Disk2, Disk3...).
- Insert the (first) diskette into a driver and change to this drive.
- Enter <INSTALL>.

The installation program gives you further instructions.

6.2.2 Software installation under Windows NT / 95

- Select the directory PA7400\32bit\Disk1.
- Start the set-up program "setup.exe" (double click)
- Select one of the 3 parameters
  1- typical
  2- compact
  3- custom

Proceed as indicated on the screen and read attentively the "Software License" and "Readme".
In "custom", you can select your operating system.

The installation program gives you further instructions.

6.3 Board configuration with ADDIREG

The ADDIREG registration program is a 32-bit program for Windows NT 4.0/ 95. The user can registrate all hardware information necessary to operate the ADDI-DATA PC boards.

6.3.1 Program description

IMPORTANT!
Insert the ADDI-DATA boards to be registrated before starting the ADDIREG program.

If the board is not inserted, the user cannot test the registration.
Once the program is called up, the following dialog box appears.

Fig. 6-5: ADDIREG registration program

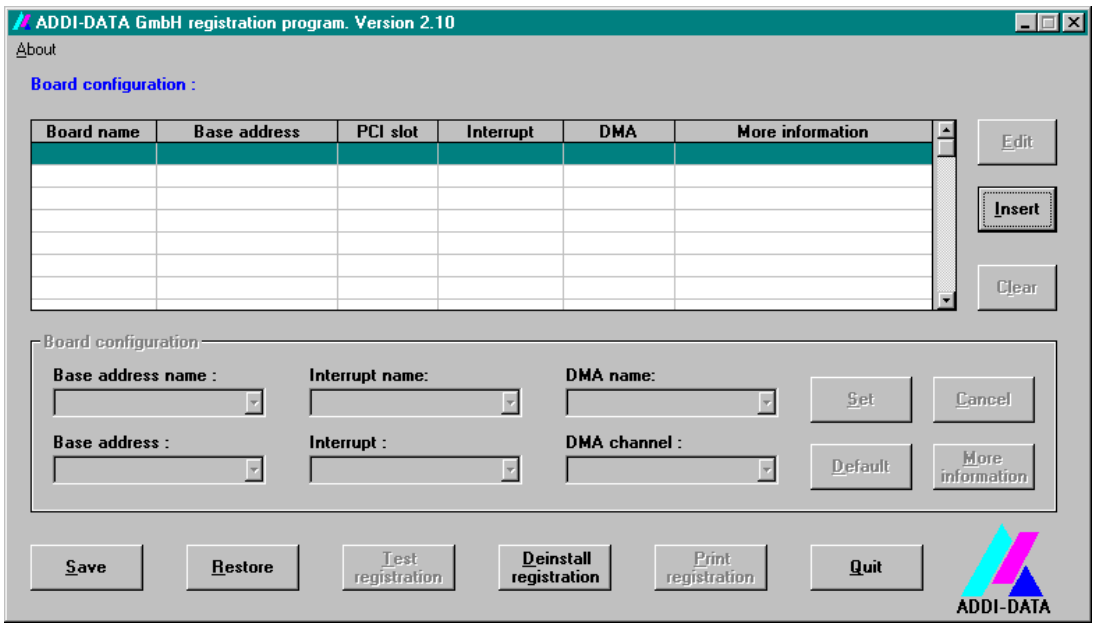


Table:
The table in the middle lists the registrated boards and their respective parameters.

Board name:
Names of the different registrated boards (e.g.: APCI-3120).
When you start the program for the first time, no board is registrated in this table.

Base address:
Selected base address of the board.

PCI slot:
Used PCI slot. If the board is no PCI board, the message „NO“ is displayed.

Interrupt:
Used interrupt of the board. If the board uses no interrupt, the message „Not available“ is displayed.

DMA:
Indicates the selected DMA channel or „Not available“ if the board uses no DMA.

More information:
Additional information like the identifier string (e.g.: PCI1500-50) or the installed COM interfaces.

Text boxes:

Under the table you will find 6 text boxes in which you can change the parameters of the board.

Base address name:
When the board operates with several base addresses (One for port 1, one for port 2, etc.) you can select which base address is to be changed.

Base address:
In this box you can select the base addresses of your PC board. The free base addresses are listed. The used base addresses do not appear in this box.

Interrupt name:
When the board must support different interrupt lines (common or single interrupts), you can select them in this box.

Interrupt:
Selection of the interrupt number which the board uses.

DMA name:
When the board supports 2 DMA channels, you can select which DMA channel is to be changed.

DMA channel:
Selection of the used DMA channel.

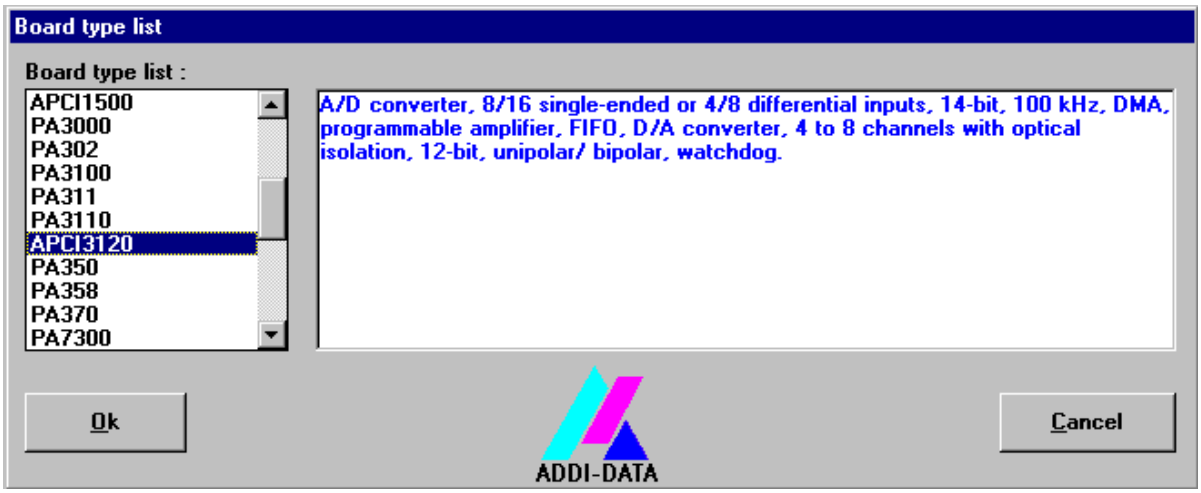
Buttons:

Edit[1]:
Selection of the highlighted board with the different parameters set in the text boxes. Click on „Edit“ to activate the data or click twice on the selected board.

Insert:
When you want to insert a new board, click on „Insert“. The following dialog window appears:

1 "x": keyboard shorcuts; e.g. "Alt + e" for Edit

Fig. 6-6: Configuring a new board



All boards you can registrate are listed on the left. Select the wished board. (The corresponding line is highlighted).
On the right you can read technical information about the board(s).
Activate with „OK“; You come back to the former screen.

Clear:
You can delete the registration of a board. Select the board to be deleted and click on „Clear“.

Set:
Sets the parametered board configuration. The configuration should be set before you save it.

Cancel:
Reactivates the former parameters of the saved configuration.

Default:
Sets the standard parameters of the board.

More information:
You can change the board specific parameters like the identifier string, the COM number, the operating mode of a communication board, etc...
If your board does not support these information, you cannot activate this button.

Save:
Saves the parameters and registrates the board.

Restore:
Reactivates the last saved parameters and registration.

Test registration:
Controls if there is a conflict between the board and other devices.
A message indicates the parameter which has generated the conflict. If there is no conflict, „OK“ is displayed.

Deinstall registration:
Deinstalls the registrations of all board listed in the table.

Print registration:
Prints the registration parameter on your standard printer.

Quit:
Quits the ADDIREG program.

6.3.2 Registrating a new board

IMPORTANT!
To registrate a new board, you must have administrator rights.
Only an administrator is allowed to registrate a new board or change a registration.

- Call up the ADDIREG program. The figure 6-5 is displayed on the screen. Click on „Insert“. Select the wished board.
- Click on „OK“. The default address, interrupt, and the other parameters are automatically set in the lower fields. The parameters are listed in the lower fields. If the parameters are not automatically set by the BIOS, you can change them. Click on the wished scroll function(s) and choose a new value. Activate your selection with a click.
- Once the wished configuration is set, click on „Set“.
- Save the configuration with „Save“.
- You can test if the registration is „OK“.
  This test controls if the registration is right and if the board is present.
  If the test has been successfully completed you can quit the ADDIREG program.
  The board is initialised with the set parameters and can now be operated.

  In case the registration data is to be modified, it is necessary to boot your PC again. A message asks you to do so. When it is not necessary you can quit the ADDIREG program and directly begin with your application.

6.3.3 Changing the registration of a board

IMPORTANT!
To change the registration of a board, you must have administrator rights.
Only an administrator is allowed to registrate a new board or change a registration.

- Call up the ADDIREG program. Select the board to be changed.
  The board parameters (Base address, DMA channel, ..) are listed in the lower fields.
- Click on the parameter(s) you want to set and open the scroll function(s).
- Select a new value. Activate it with a click.
  Repeat the operation for each parameter to be modified.
- Once the wished configuration is set, click on „Set“.
- Save the configuration with „Save“.
- You can test if the registration is „OK“.
  This test controls if the registration is right and if the board is present.

If the test has been successfully completed you can quit the ADDIREG program. The board is initialised with the set parameters and can now be operated.

In case the registration data is to be modified, it is necessary to boot your PC again. A message asks you to do so. When it is not necessary you can quit the ADDIREG program and directly begin with your application.

6.3.4 Removing the ADDIREG program

- Click "Start".
- In "Settings / Control panel", click the icon "Add/Remove programs".
- The window "Add/Remove Programs Properties" appears. In the lower list select ADDIREG and click "Add/Remove".

Proceed as indicated on the screen until the complete removing of ADDIREG.

6.4 Error analysis per Internet

Do not hesitate to visit us or e-mail your questions.

Our Internet page is accessed:
- per e-mail: info@addi-data.de
- per Internet : http://www.addi-data.de. or
http://www.addi-data.com

Free downloads of standard software

You can download the latest version of the device driver for the board **PA 7400.**

IMPORTANT!
You will be prompted to enter the following pass word when starting the EXE. File

10ADDICOM52

7 CONNECTION TO THE PERIPHERAL

7.1 Connector pin assignments

Fig. 7-1: 25-pin SUB-D male connector for the serial port 1

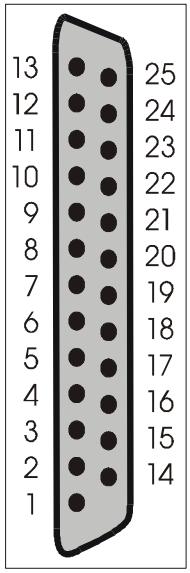


Table 7-1: Pin assignment for the serial port 1

Pin	Signal	Mode / Meaning
1	PG	Ground of the protection circuitry
2	TxD	RS 232 transmitted data
3	RxD	RS 232 received data
4	RTS	RS 232 request to send
5	CTS	RS 232 clear to send
6	DSR	RS 232 data set ready
7	SGND	RS 232 signal ground
8	DCD	RS 232 data carrier detect
20	DTR	RS 232 data terminal ready
22	RI	RS 232 ring indicator
17	Rx+ / Tx+ port 1	RS 422 receive / RS 485 transmit and receive
16	Rx- / Tx- port 1	RS 422 receive / RS 485 transmit and receive
24	Tx+ port 1	RS 422 transmit
23	Tx- port 1	RS 422 transmit
14	NC	Not connected
13	NC	Not connected
21	NC	Not connected
19	NC	Not connected
10	GND isola 1	Isolated ground of CL port 1
11	+Tx-CL-DATA1	CL transmitted data
12	-Tx-CL-DATA1	CL transmitted data
18	+RCV-CL-DATA1	CL received data
25	-RCV-CL-DATA1	CL received data
9	Current source out 1	Current source out 1
15	Current source out 2	Current source out 2

Fig. 7-2: 9-pin SUB-D male connector for the serial port 2

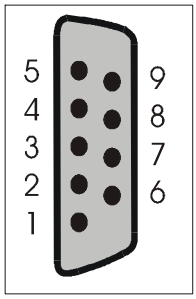
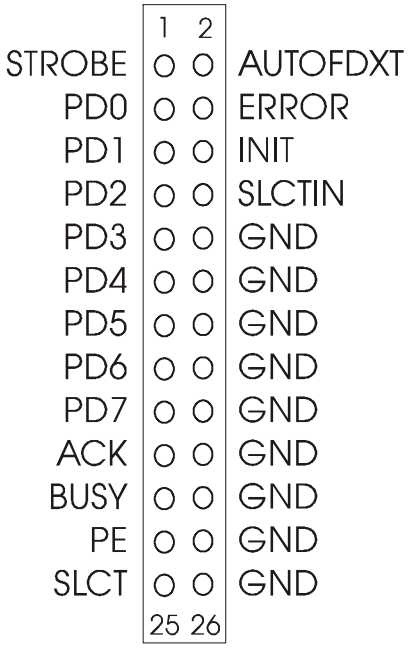


Table 7-2: Pin assignment for the serial port 2

Pin	Signal	Mode / Meaning
1	Rx+ / Tx+ port 2	RS 422 receive / RS 485 transmit and receive
6	Rx- / Tx- port 2	RS 422 receive / RS 485 transmit and receive
2	Tx+ port 2	RS 422 transmit
7	Tx- port 2	RS 422 transmit
5	GND isola 2	Isolated ground of CL, port 2
3	+RCV-CL-DATA2	CL received data
8	-RCV-CL-DATA2	CL received data
4	+Tx-CL-DATA2	CL transmitted data
9	-Tx-CL-DATA2	CL transmitted data

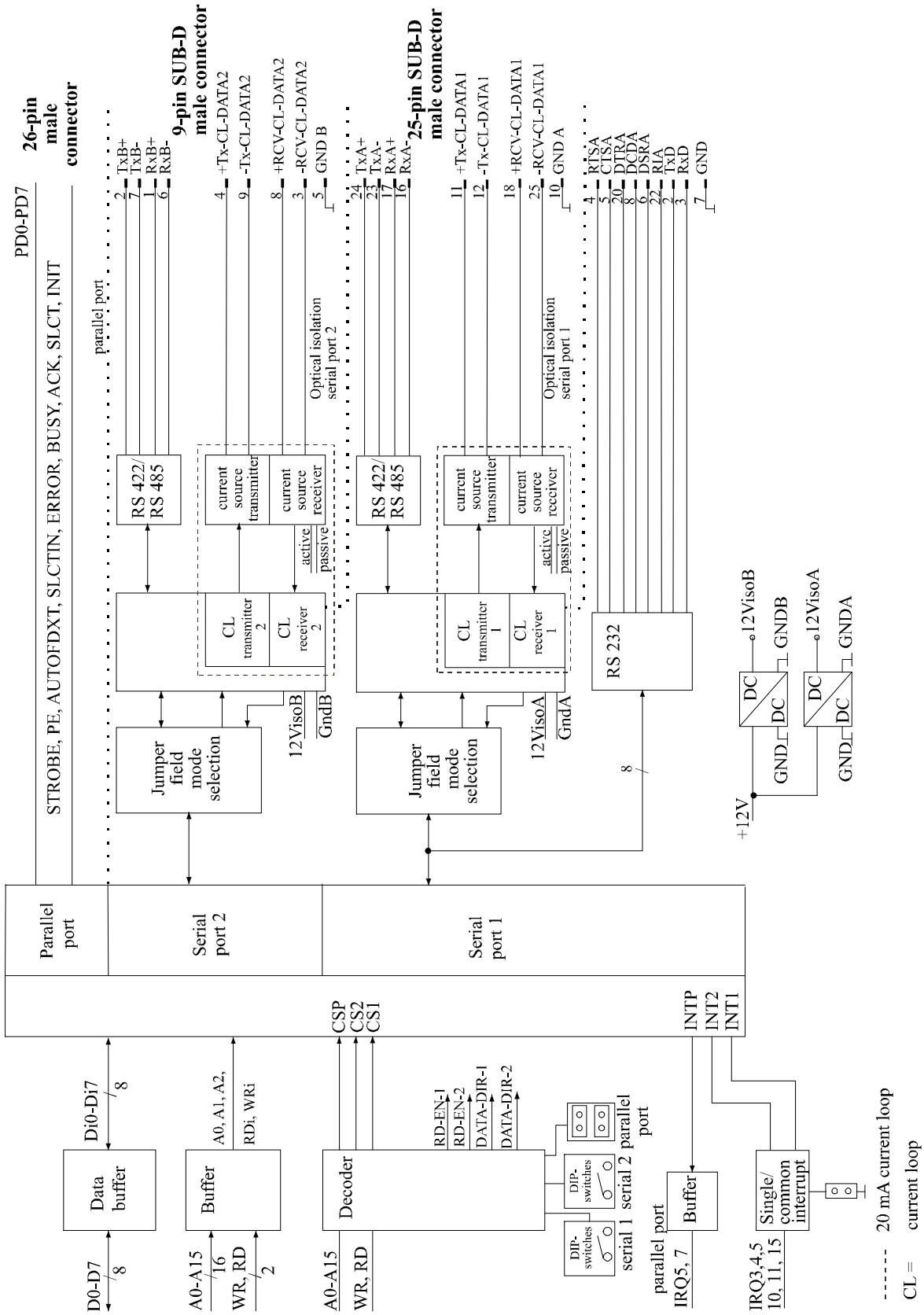
Fig. 7-3: 26-pin male connector for the parallel port



8 FUNCTIONS OF THE BOARD

8.1 Block diagram

Fig. 8-1: Bloc diagram of the board PA 7400



8.2 I/O mapping

Board **PA 7400** requires an address range of 20 bytes within the I/O address space of the PC.

They are allocated as follows:
- 8 bytes for serial port 1
- 8 bytes for serial port 2
- 4 bytes for the parallel port.

8.2.1 I/O map - serial port 1

Table 8-1: I/O map - Serial port 1

	I/O Read					I/O Write				
Base-S1 +0	RECEIVER HOLDING REGISTER A					TRANSMIT HOLDING REGISTER A				
Base-S1 +1	INTERRUPT ENABLE REGISTER A									
Base-S1 +2	INTERRUPT IDENTIFICATION REGISTER A									
Base-S1 +3	LINE CONTROL REGISTER A									
Base-S1 +4	MODEM CONTROL REGISTER A								RTSA	DTRA
Base-S1 +5	LINE STATUS REGISTER A									
Base-S1 +6	MODEM STATUS REGISTER A									
Base-S1 +7	INT2	INT1		DATA-DIR-2	DATA-DIR-1		RD-EN-2	DATA-DIR-2	RD-EN-1	DATA-DIR-1
	D7	D6		D1	D0		D3	D2	D1	D0

You will find the meaning of write and read data on addresses **Base-S1 +0** to **Base-S1 +6**

Address byte Base-S1 +7 (write):

DATA-DIR-1	Control bit of the transmitter for RS 485 serial port 1 See RS485 transmitter control
RD-EN-1	Control bit of the receiver for RS 485 serial port 1 See RS485 receiver control
DATA-DIR-2	Control bit of the transmitter for RS 485 serial port 2 RS485 transmitter control
RD-EN-2	Control bit of the receiver for RS 485 serial port 2 RS485 receiver control

Address byte Base-S1 +7 (read):

DATA-DIR-1	Control bit of the transmitter for RS 485 serial port 1
DATA-DIR-2	Control bit of the transmitter for RS 485 serial port 2
INT1	Status bit for interrupt serial port 1
INT2	Status bit for interrupt serial port 2

8.2.2 I/O map - serial port 2

Table 8-2: I/O map - Serial port 2

	I/O Read	I/O Write		
Base-S2 +0	RECEIVER HOLDING REGISTER B	TRANSMIT HOLDING REGISTER B		
Base-S2 +1	INTERRUPT ENABLE REGISTER B			
Base-S2 +2	INTERRUPT IDENTIFICATION REGISTER B			
Base-S2 +3	LINE CONTROL REGISTER B			
Base-S2 +4	MODEM CONTROL REGISTER B		RTSB	DTRB
Base-S2 +5	LINE STATUS REGISTER B			
Base-S2 +6	MODEM STATUS REGISTER B			
Base-S2 +7	SCRATCH PAD REGISTER B	SCRATCH PAD REGISTER B		

8.2.3 I/O map - parallel port

Table 8-3: I/O map - Parallel port

	I/O Read	I/O Write
Base-P +0	PORT REGISTER	PORT REGISTER
Base-P +1		STATUS REGISTER
Base-P +2	CONTROL REGISTER	COMMAND REGISTER

8.3 Serial communication: serial ports 1 and 2

You can control the communication on serial ports 1 and 2 as follows:

- either through commands of the operating system
- or by programming directly the component DUART 16C452 (option U: DUART 16C552).

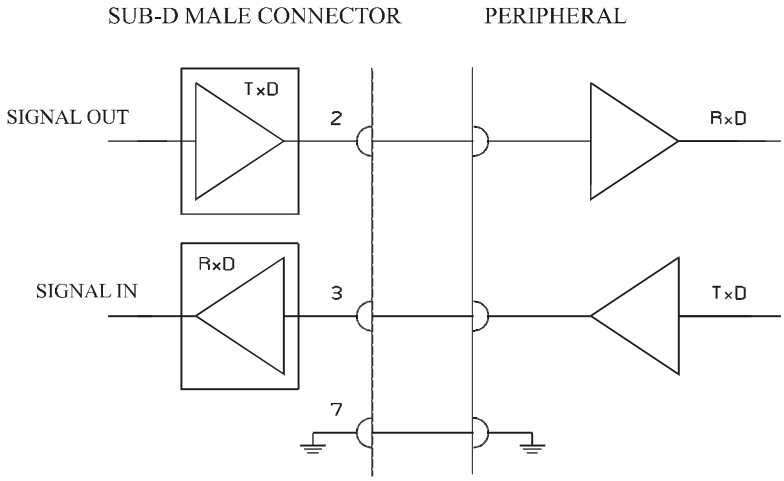
8.3.1 RS232 - Only serial port 1

Operation without the modem control signals DTRA, CTSA, RTSA, DCDA, DSRA, RIA

- If the communication software **does not** support the control of the modem control signals,

➔ the following cabling is sufficient.

Fig. 8-2: Operation without modem control signals



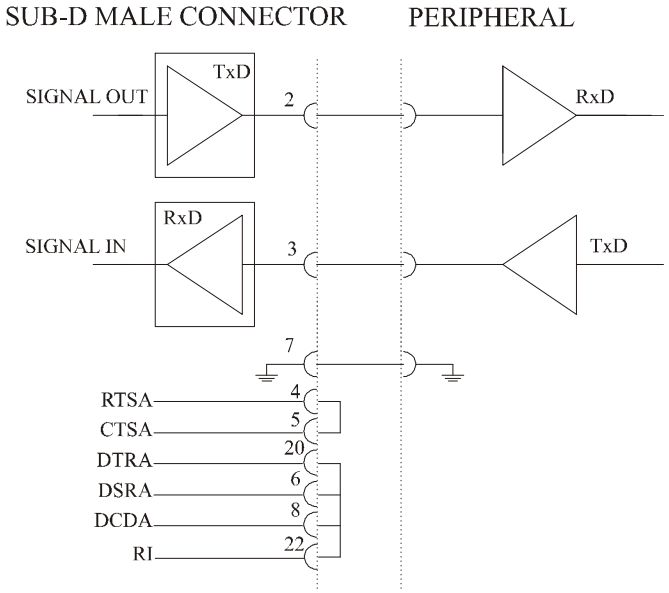
Operation with the modem control signals DTRA, CTSA, RTSA, DCDA, DSRA, RIA

- If the communication software supports the control of the modem control signals,
- If the cabling is limited to the connection of the RxD, TxD and GND lines,

➔ **connect** the modem control signals as follows to the connector.

RTSA ® CTSA
DTRA ® DSRA ® DCDA ® RIA

Fig. 8-3: Operation with modem control signals



8.3.2 RS422

WARNING!
If jumper J11(6) has a wrong setting the board may be destroyed.

The receiving component for RS 422 is simultaneously the receiving and transmitting component for RS 485.

• **Disable** the transmitter for RS 485 by setting jumper J11(6) in position B[1)].

Controlling the RS 422 transmitter

If the board is connected to a RS 422 network, the transmitter has to be disabled after transmission.

This occurs by controlling the transmitter with jumper J21(10)[1)]:

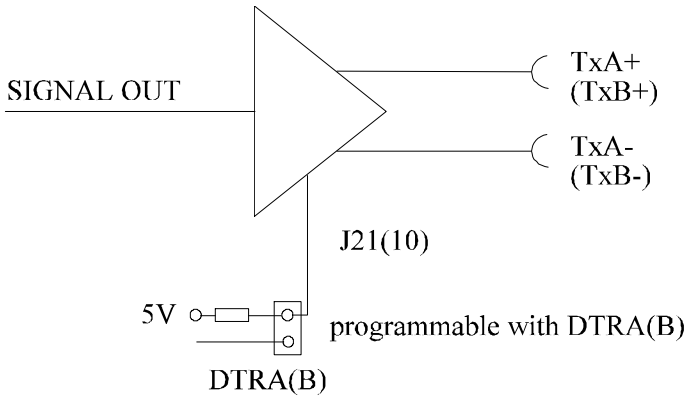
Bit **DTRA(B)** is the bit D0 of the MODEM CONTROL REGISTER A(B) on address **Base-S1(2) +4** of the DUART component.

DTRA(B) = 0	Transmitter disabled (reset value)
DTRA(B) = 1	Transmitter enabled

The **DTRA(B)** bit simultaneously controls the hardware pin DTRA(B) of the DUART.

1 See "Jumper settings and functions"

Fig. 8-4: Enabling the RS 422 transmitter



- **Make sure** that the values of data bits D1-D7 are not overwritten when writing in the MODEM CONTROL REGISTER A(B) on **Base-S1(2) +4**.

Controlling the RS 422 receiver

You control the RS 422 receiving component with bit **RD-EN-1(2)**.

- **Set** jumper J16(7) on pos. B**.**
  Bit **RD-EN-1(2)** is the bit D1(3) of address **Base-S1 +7** of the DUART component.

RD-EN-1(2) = 0	Reception is possible (reset value)
RD-EN-1(2) = 1	Reception is not possible

Terminators and open-circuit potential for RS 422

The receive lines RxA+(RxB+) and RxA-(RxB-) are in RS 422 at an open-circuit potential through 1 K ohm resistors.

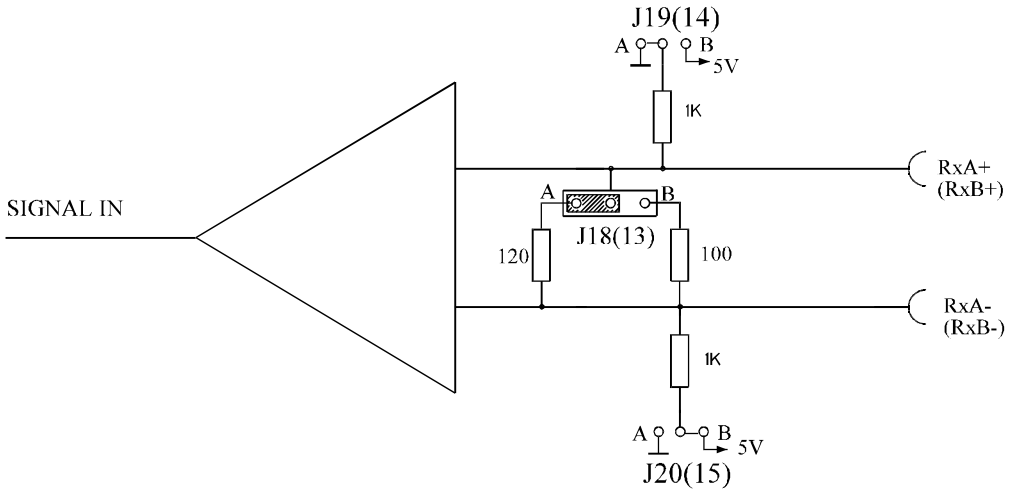
If the board is located at the end of the network
- **insert** a terminator through jumper J18(13)**.**
  J18(13) in pos. A 120 Ω terminator
  J18(13) in pos. B 100 Ω terminator

IMPORTANT!
If the board does not receive data, and if you want to detect whether a line interruption has occurred (damaged line, no device connected),

- **invert the open-circuit potential** of the receive lines RxA+(RxB+) and RxA-(RxB-).

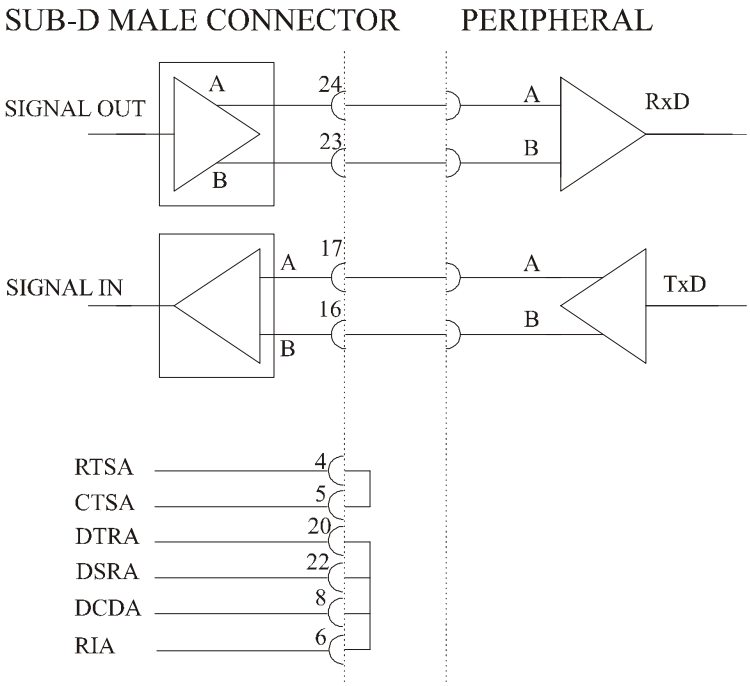
Set the jumpers as follows:
J19(14) in pos. A
J20(15) in pos. B

Fig. 8-5: Inserting a terminator and inverting the open-circuit potential



RS 422 cabling - serial port 1

Fig. 8-6: RS 422 cabling for serial port 1



- If the communication software controls the modem control signals,

➔ **connect** the modem control signals as follows to the connector.

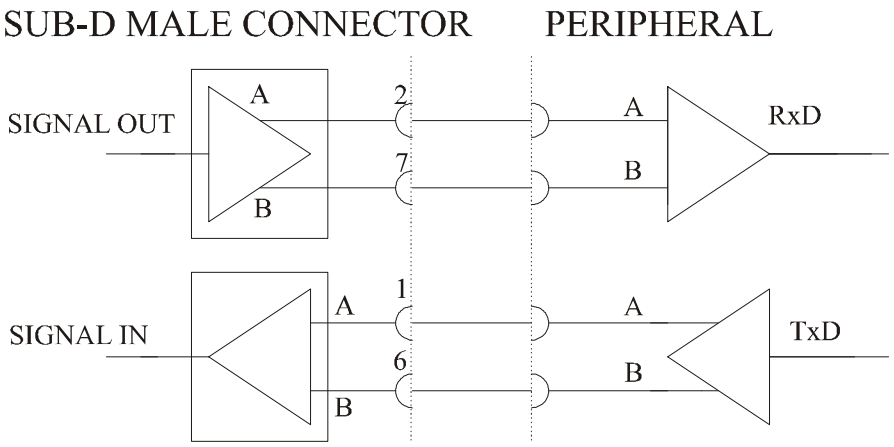
RTSA ® CTSA
DTRA ® DSRA ® DCDA ® RIA

RS 422 cabling - serial port 2

The modem control signals are connected on the board as follows:

RTSB ® CTSB
DTRB ® DSRB® DCDB ® RIB

Fig. 8-7: RS 422 cabling for serial port 2

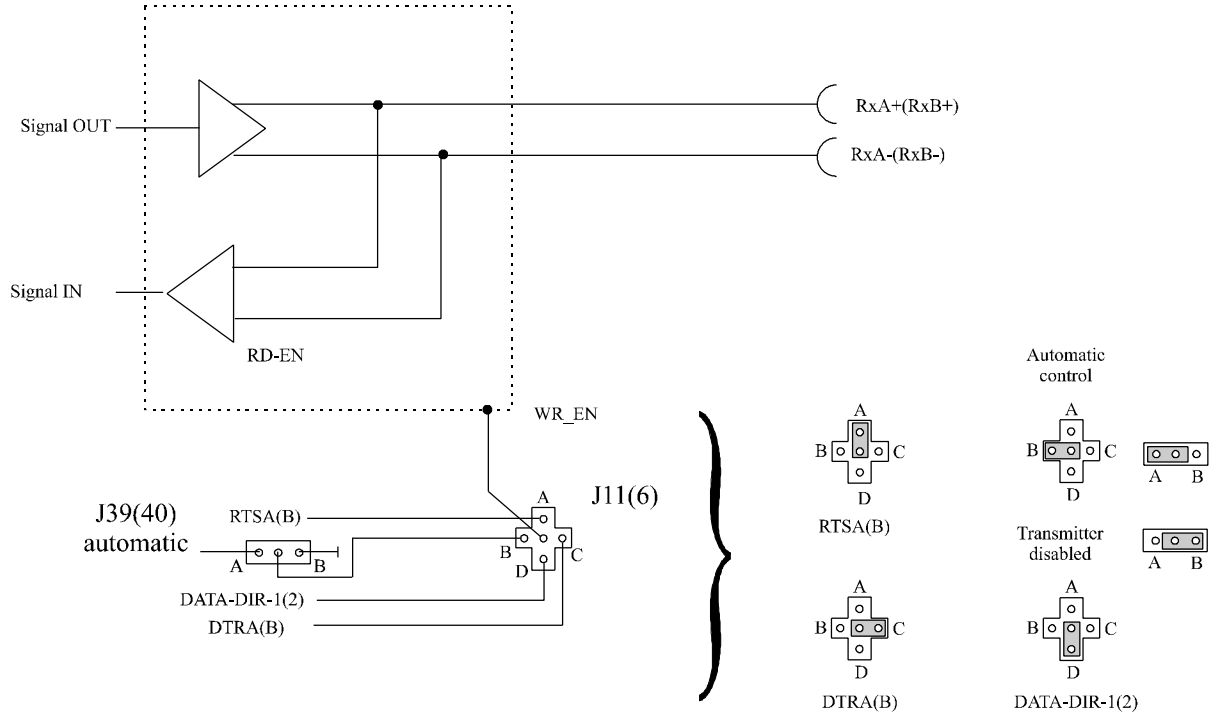


8.3.3 RS485

Controlling the RS 485 transmitter

Refer to Chapter 5.2 Jumper settings and functions

Fig. 8-8: Enabling the automatic transmitter with the signals DTRA(B), RTSA(B) or DATA-DIR-1(2) through jumper J11(6)



- **Make sure** that the values of data bits D2-D7 are not overwritten when writing in the MODEM CONTROL REGISTER A(B) on **Base-S1(2) +4**.

Controlling the RS 485 receiver

• **You control** the receiver through jumper J16(7).

J16(7) in pos. A — Control with bit **RTSA(B)**, **DTRA(B)** or **DATA-DIR-1(2).**

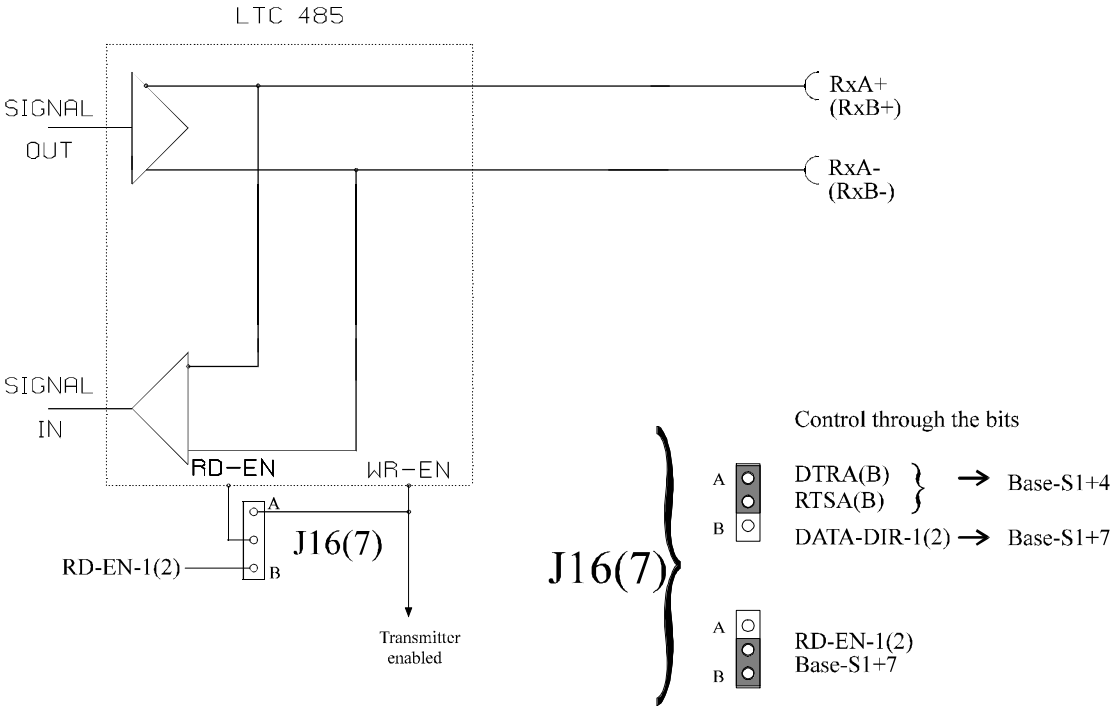
With jumper J16(7) you enable alternately the transmitter and the receiver. It means that:
- if you enable the transmitter, the receiver is disabled
- if you disable the transmitter, the receiver is disabled.

J16(7) in pos. B — Control with bit **RD-EN-1(2)**
Bit D1(3), address **Base-S1 +7**) (settings at delivery)

RD-EN-1(2) = 0 Reception possible (reset value)
RD-EN-1(2) = 1 Reception not possible

After a system reset bit **RD-EN-1(2)** = 0. The system is in the receiving mode.

Fig. 8-9: Enabling the receiver with jumper J16(7)



Terminators and open-circuit potential in RS 485

The receive lines RxA+(RxB+) and RxA-(RxB-) are in RS 485 at an open-circuit potential through 1 K ohm resistors.

See Chapter 5.2: "Jumper settings"

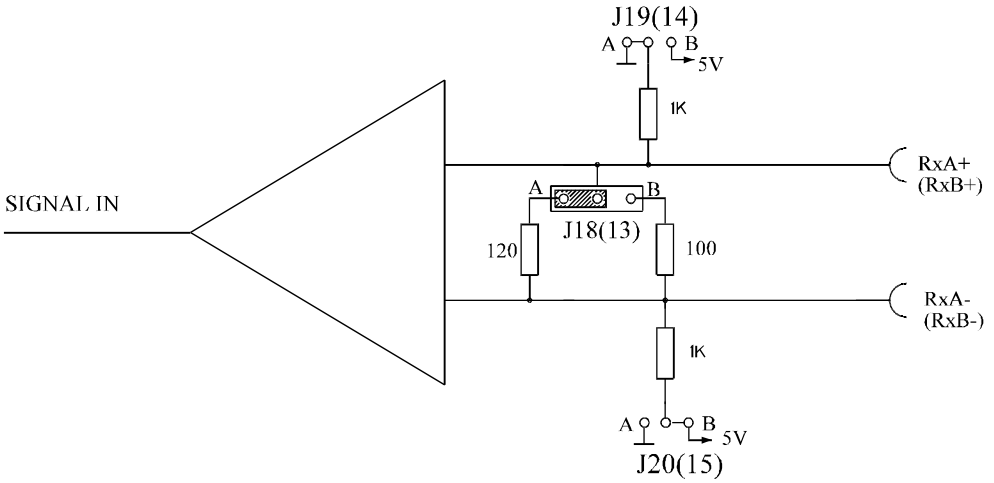
If the board is located at the end of the network
• **Insert** a terminator through jumper J18(13).

IMPORTANT!
If the board does not receive data and if you want to detect whether a line interruption has occurred (damaged line, no device connected),

• **Invert the open-circuit potential** of the receive lines RxA+(RxB+) and RxA-(RxB-).

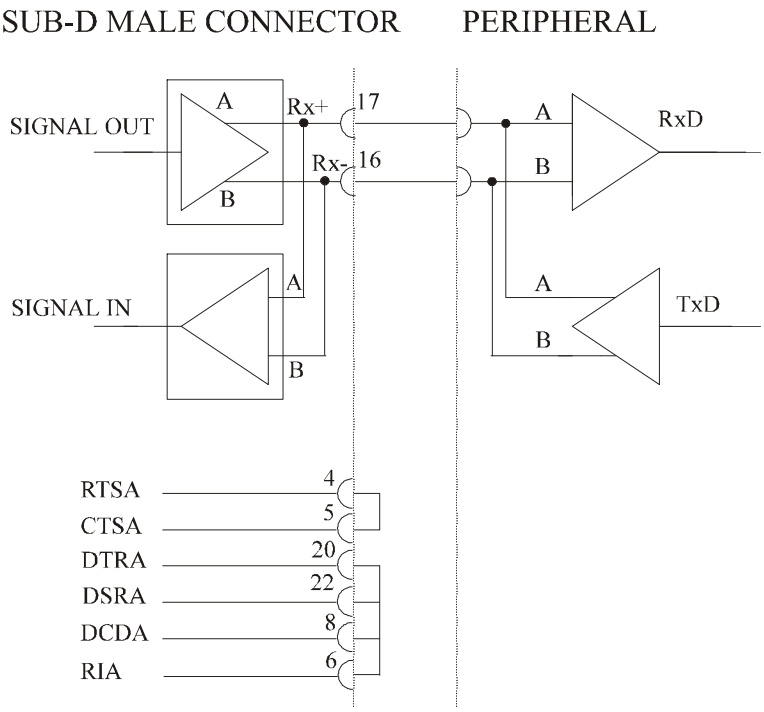
Set the jumpers as follows: J19(14) in pos. A
J20(15) in pos. B

Fig. 8-10: Inserting a terminator and inverting the open-circuit potential



RS 485 cabling - serial port 1

Fig. 8-11: RS 485 cabling for serial port 1



• If the communication software supports the control of the modem control signals,

➔ **connect** the modem control signals as follows to the connector.

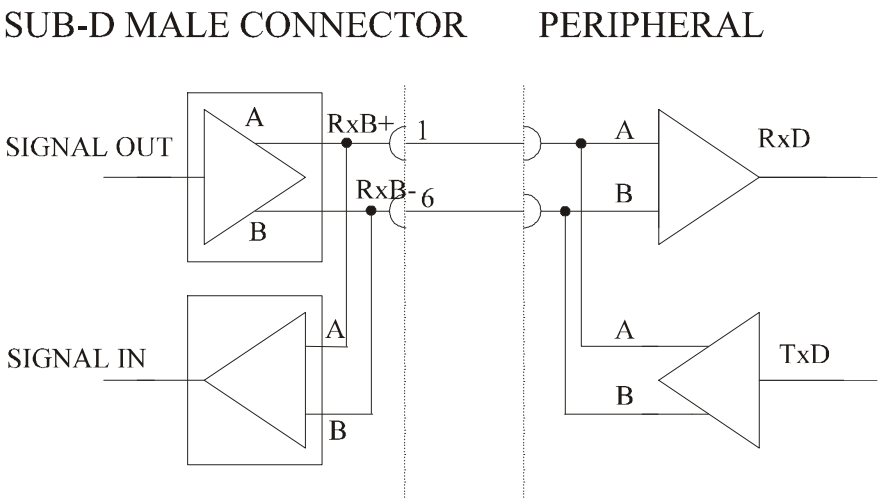
RTSA ® CTSA
DTRA ® DSRA ® DCDA ® RIA

RS 485 cabling - serial port 2

The modem control signals are connected on the board as follows:

RTSB ® CTSB
DTRB ® DSRB ® DCDB ® RIB

Fig. 8-12: RS 485 cabling for serial port 2



8.3.4 Current loop

You can operate serial ports 1 and 2 like current loop ports.
You can receive and send actively as well as passively.

There is for each mode, transmission and reception, one 20 mA current loop source.

- **Make sure** that the setting corresponds to the peripheral current loop.

Setting the current sources

Active mode:
The current sources of the board deliver the necessary 20mA current loop on the receive and transmit line.

Passive mode:
The current sources of the peripheral deliver the necessary 20mA current loop on the receive and transmit line.

According to the configuration the mode is set as an active transmission/reception or a passive transmission/reception.

- **Select** the current sources:
  with jumper J22(3) (transmit line)
  with jumper J23(4) (receive line).

20mA current loop cabling

Serial port 1
If the communication software supports the control of the modem control signals.

- **Connect** the modem control signals to the connector as follows.
  RTSA ® CTSA
  DTRA ® DSRA ® DCDA ® RIA

Serial port 2
The modem control signals are connected on the board as follows:
RTSB ® CTSB
DTRB ® DSRB ® DCDB ® RIB

Fig. 8-13: Active transmission / active reception

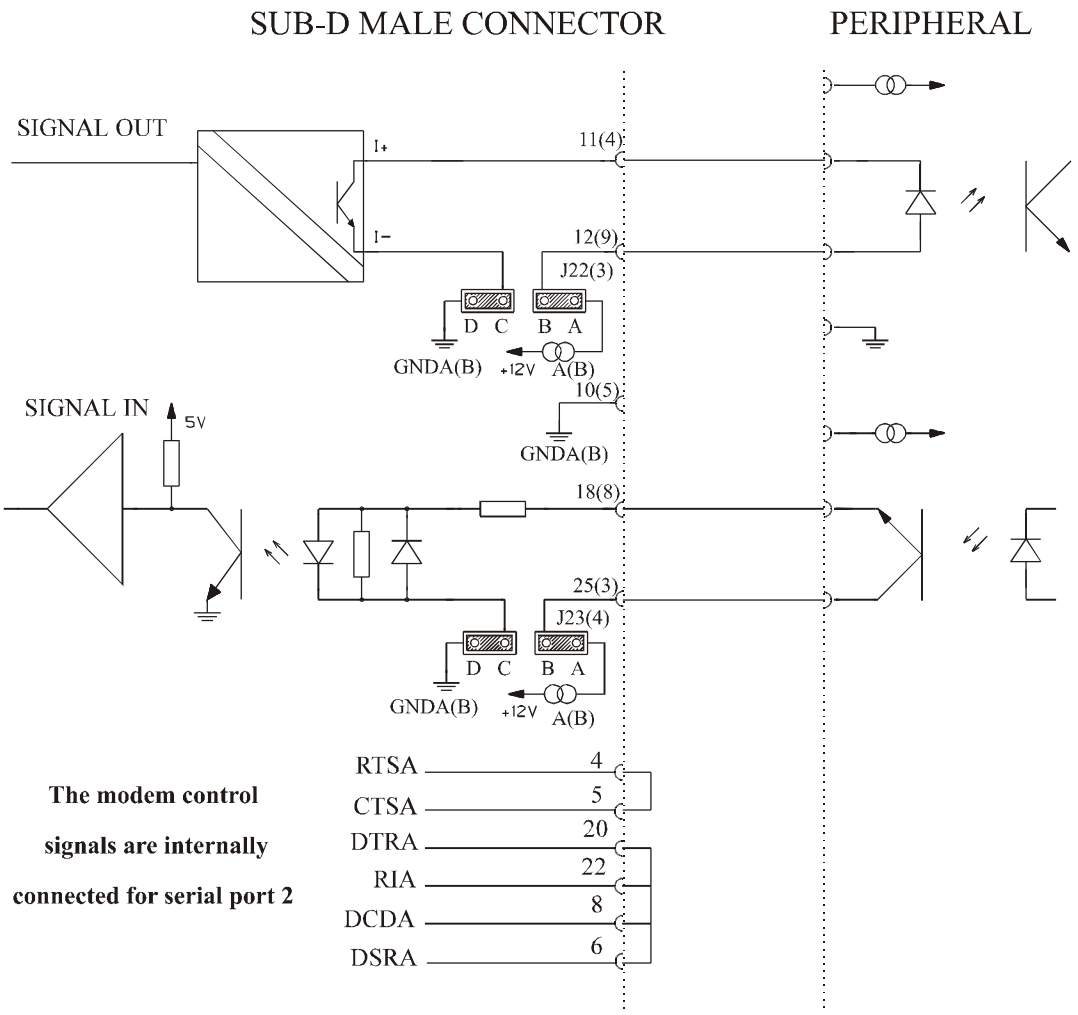


Fig. 8-14: Active transmission / passive reception

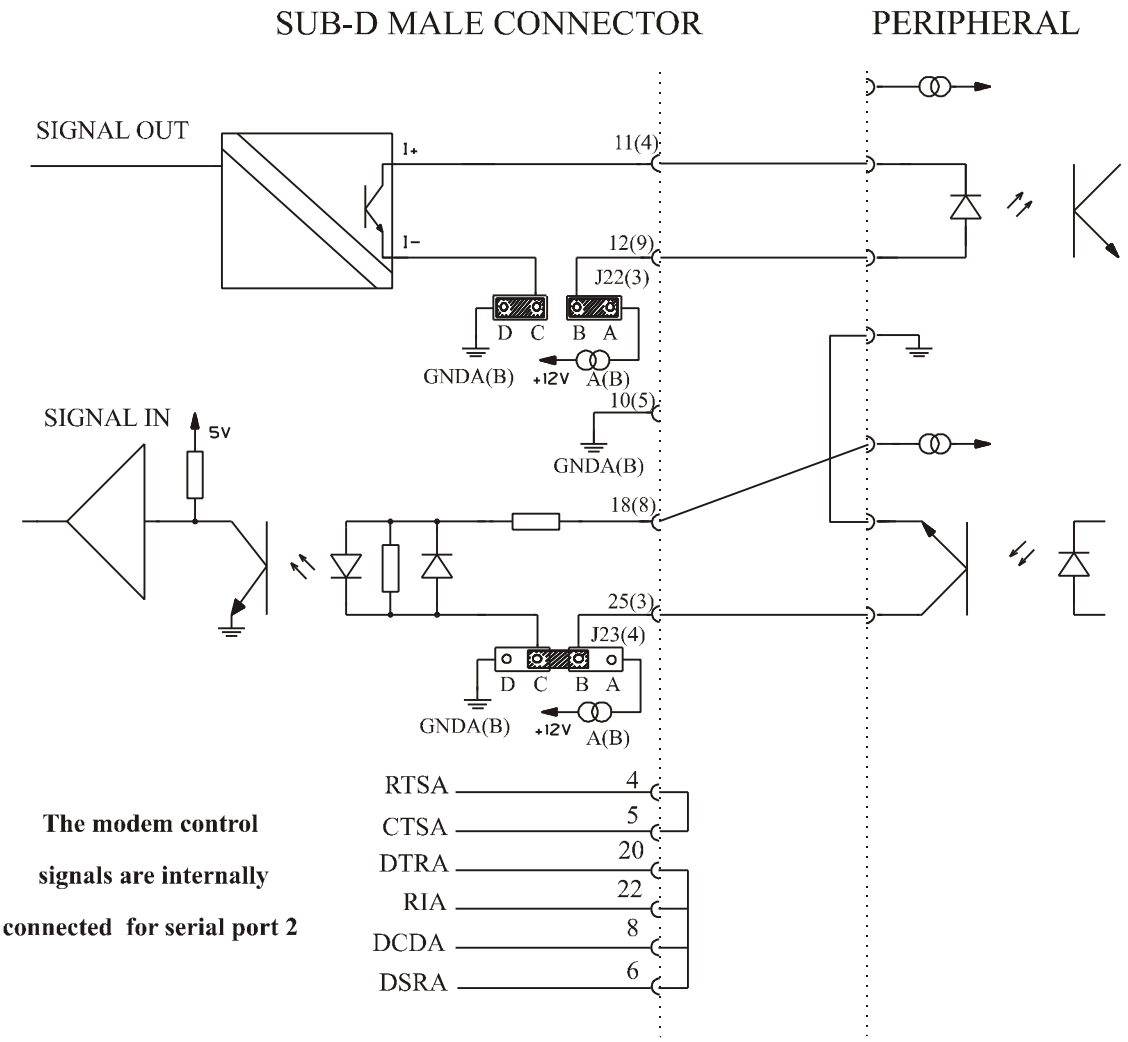


Fig. 8-15: Passive transmission / active reception

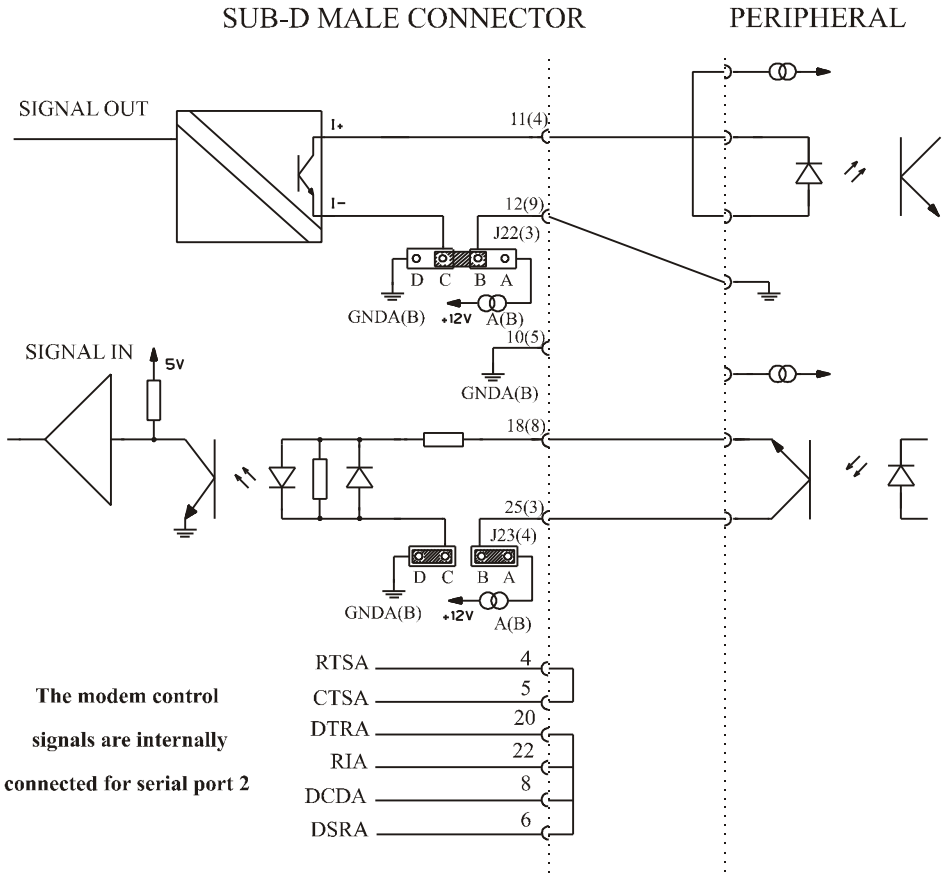
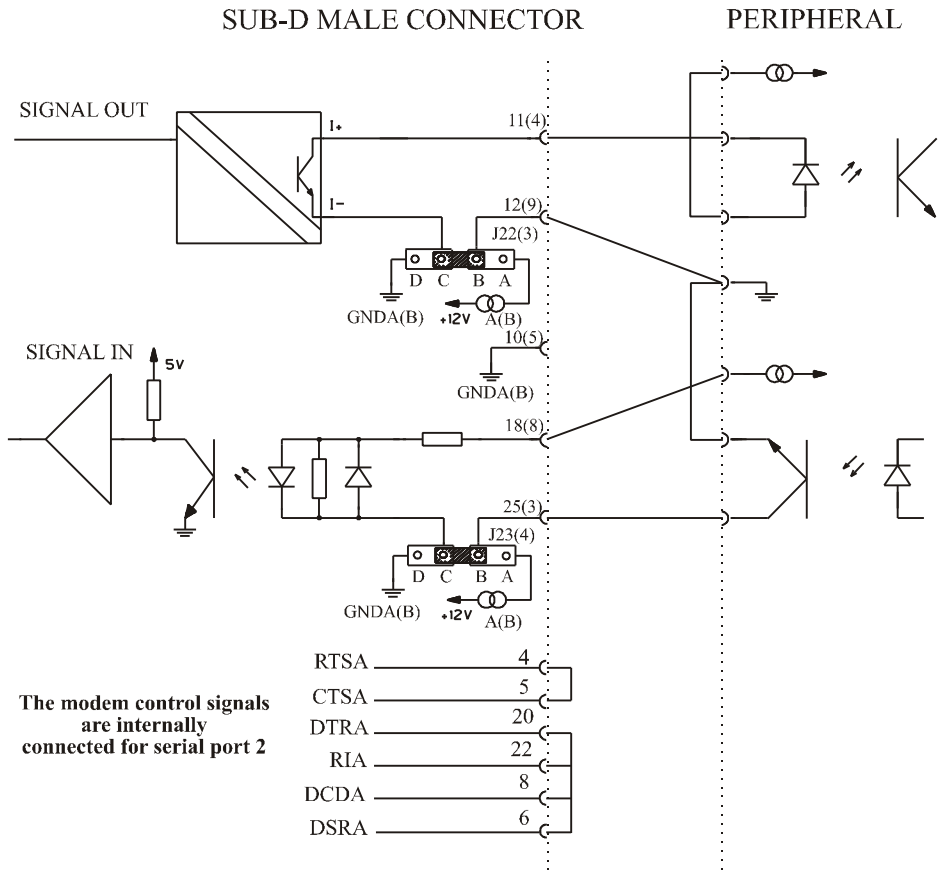


Fig. 8-16: Passive transmission/ passive reception



8.3.5 Selecting the reference point of the protection circuitry

On serial ports 1 and 2 the input and output lines are protected against overvoltage directly behind the peripheral connector through damping diodes.

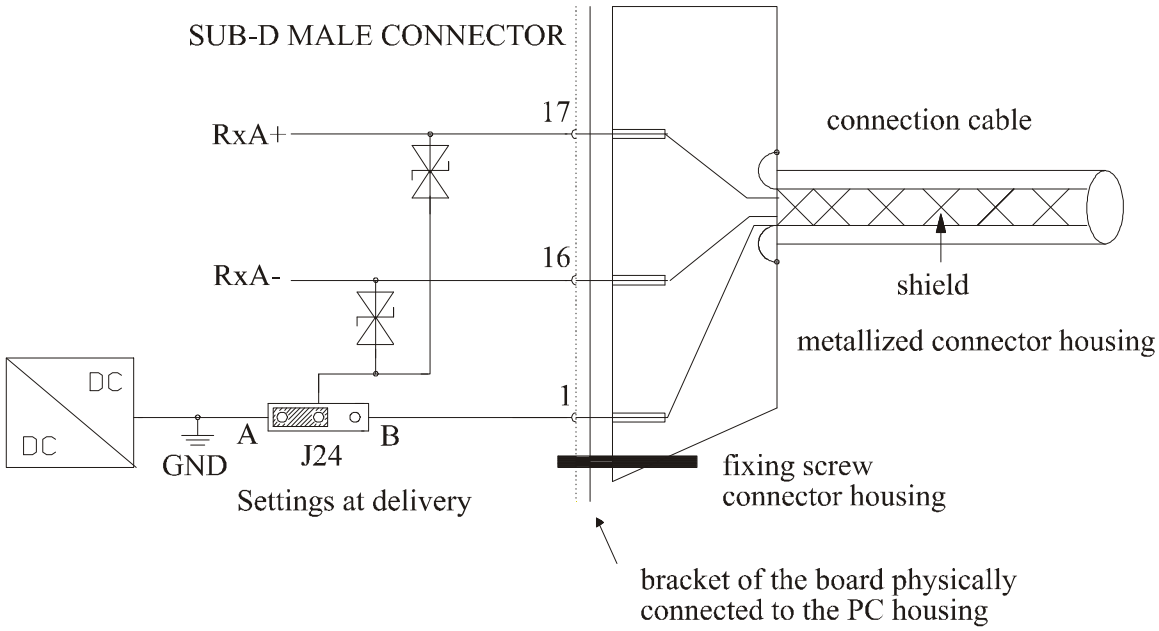
- RS 422, RS 485 and 20mA current loop (optically isolated)
- RS 422 and RS 485
The protection circuitry is composed of TRANSIL damping diodes on all lines.
Breakdown voltage = ± 6.5V
All the lines are protected against short-circuit through positive temperature coefficient resistors.
- 20mA current loop
The current loops are protected with TRANSIL damping diodes.
Breakdown voltage: ± 26V

Serial port 1

• **Select** the reference point of the protection circuitry through jumper J24.

IMPORTANT!
Make sure that pin 1 of the 25-pin SUB-D connector is earthed externally.

Fig. 8-17: Selecting the reference point of the protection circuitry (serial port 1)



If pin 1 of the 25-pin SUB D connector is used for derivating noise voltage,
• **connect** pin 1 of the connection cable
- with the cable shield as well as
- with the housing of the female connector fixed to the cable.

Serial port 2

• **Select** the reference point of the protection circuitry through jumper J5.

8.4 Parallel communication

You can control the communication on the parallel port as follows:

- either through commands of the operating system
- or by programming directly the component DUART 16C452 (option U: DUART 16C552).

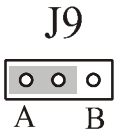
The parallel port has the same function as a standard printer interface (CENTRONICS).

You can program and control the parallel port through standard
- device drivers,
- programming languages (C, PASCAL...)
- or through direct I/O procedures.

J9 in pos. B	The PORT REGISTER on address **Base-P +0** is configured as an output port.

***Reading external data through the PORT REGISTER (*Base-P +0)**
- **Set** jumper J9 in pos. A.

Fig. 8-18: Jumper settings - J9



- **Write** the value 020H on the address **Base-P +2**.

8.5 Interrupt

Serial port 1 and 2

- **Select** for serial port 1 the wished interrupt line through J8 and jumper field J31.

Parallel port

- **Select** for the parallel port the wished interrupt line through jumper J29.

Single interrupt - Common interrupt

You can operate the board **PA 7400** either with
- single interrupt
- or common interrupt.

Analysing the common interrupt

You can analyse the common interrupt as follows:
- with the INTERRUPT IDENTIFICATION REGISTER of the DUART component.
- or with bits **INT1** and **INT2**
  Bits D7 and D6 of address **Base-S1 +7.**

Table 8-4: I/O map

	I/O Read					I/O Write				
Base-S1(2) +1	INTERRUPT ENABLE REGISTER A(B)									
Base-S1(2) +2	INTERRUPT IDENTIFICATION REGISTER A(B)									
Base-S1 +7	INT2	INT1		DATA-DIR-2	DATA-DIR-1		RD-EN-2	DATA-DIR-2	RD-EN-1	DATA-DIR-1
	D7	D6		D1	D0		D3	D2	D1	D0

- **Establish** with the status bits **INT1** and **INT2** which serial port has triggered the interrupt request.

INT1 = 0	No interrupt request has been triggered (serial port 1)
INT1 = 1	An interrupt request has been triggered (serial port 1)
INT2 = 0	No interrupt request has been triggered (serial port 2)
INT2 = 1	An interrupt request has been triggered (serial port 2)

9 DEVICE DRIVER

To install the ports of the **PA 7400** please use the standard drivers which are delivered with Windows NT 4.0. You can read additional information about the Windows API functions for the settings and the use of the serial interfaces in:

„SERIAL COMMUNICATION in WIN32“

Moreover you will find application examples in Delphi 2.0 and VC ++ 5.0.

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